SUPPORTS COURSES
F15EBQ
F15ETX
F15ESOC

ACADEMIC STUDENT WORKBOOK
F-15E

AIR-TO-GROUND DELIVERY
AGD-2
A/G PROGRAMMABLE ARMAMENT CONTROL SYSTEM (PACS)

JULY 1998

(SUITE 3 OFP)

AIR COMBAT COMMAND

ADMINISTRATIVE INFORMATION

This student workbook is designed to provide information on the F-15E, its systems and capabilities. It is not a sole source document, but is to be used in conjunction with other standard Air Force publications and technical manuals. If you find any differences between the material contained herein and other governing regulations, adhere to the regulations and notify the OPDR.

Changes to this workbook are indicated with a heavy black line in the left margin.

Forward recommendations for revision or change to 4 TS, SJAFB, NC 27531.

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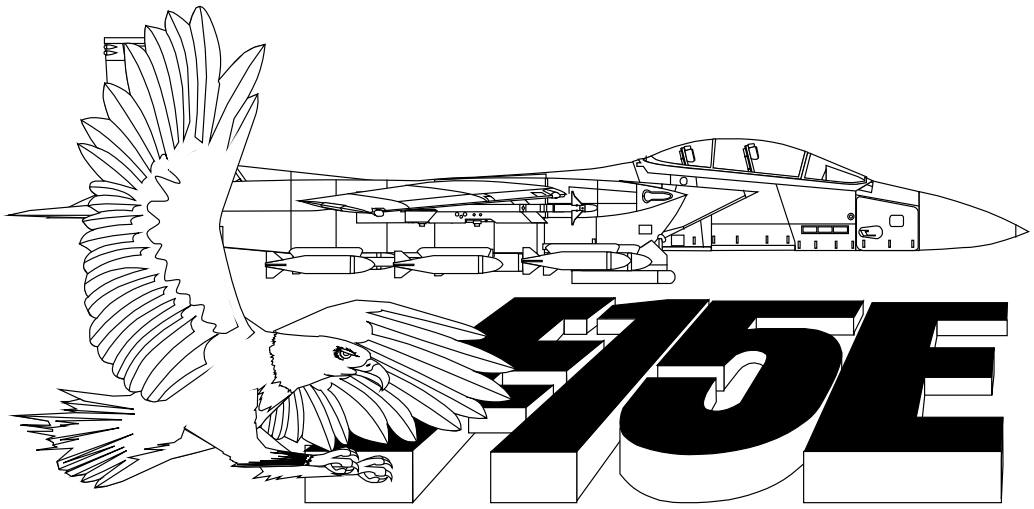
Supersedes: AGD-2, August, 1997

OPDR: 4 TS

Index of Changes

Change #	Effective Date	Pages Affected

AIR-TO-GROUND DELIVERY



COVER

A/G PROGRAMMABLE ARMAMENT CONTROL SYSTEM (PACS)

INTRODUCTION

This workbook is your guide in studying the F-15E programmable armament control system (PACS). It contains background information essential for accomplishing the associated CBT lesson. It familiarizes you with the components, nomenclature and operational characteristics of the system and provides you with knowledge needed to safely operate the F-15E aircraft.

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CRITERION REFERENCED OBJECTIVES (CROs)

1. Select the proper option to load a given weapon and program delivery options.

2. Select the proper procedures for A/G selective jettison, combat jettison and emergency jettison.

3. Interpret a PACS A/G display.

4. Identify how the PACS is affected by failures in related systems/components.

5. Identify the operational characteristics of the following PACS functions:

    a. Weapons indications
    b. Release programming
    c. Jettison

REFERENCES

TO 1F-15E-1	Section I	Stores Jettison Systems
TO 1F-15E-34-1-1		Appropriate A/G PACS Information

STUDENT PREPARATION REQUIREMENTS

BEFORE CLASS

1. Study the information contained in this workbook and complete the quiz.

2. Read the Dash 1 and Dash 34 references.

Proper preparation is essential as the CBT lesson on PACS is oriented toward practical applications. Satisfactory performance may not be possible without this background information.

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TEXT

INTRODUCTION

The programmable armament control system (PACS) provides the capability for load and release programming, arming, monitoring, and releasing/firing of air-to-surface and air-to-air munitions. The system is made up of computers and processors (CC, MPDP, PACS), wiring, displays, controls and carriage stations. It is software programmable, which allows for easy updating and has an extensive built-in test (BIT) feature that isolates faults down to the specific module for simplified, rapid repair. This lesson addresses air-to-ground munitions. Air-to-air and nuclear operations are covered in separate lessons.

A/G COMBAT WEAPON LOAD PROGRAMMING

There are a couple of reasons to tell the computers what is actually on board. For one thing, the overload warning system (OWS) uses the data to compute over-G warning information; if it bases its calculations on incorrect data, the pilot could overstress the plane without knowing it. Also, the computer uses the ballistics for whatever weapon is entered, which could make for some interesting scores if programmed for "high drags" when really carrying "slicks."

The PACS is also smart in that it does not allow programming store/station incompatibilities. For example, it knows that GBU-15s cannot be carried on CFTs, so it does not allow the crew to load them there.

To begin programming, start at the menu on an MPD/MPCD. Pressing PB #2 (ARMT) brings up the ARMT (top level PACS) menu (Figure D-1) and then use PB #7 (A/G LOAD) to bring up the A/G combat weapon load display and the first page of weapons (Figure D-1).

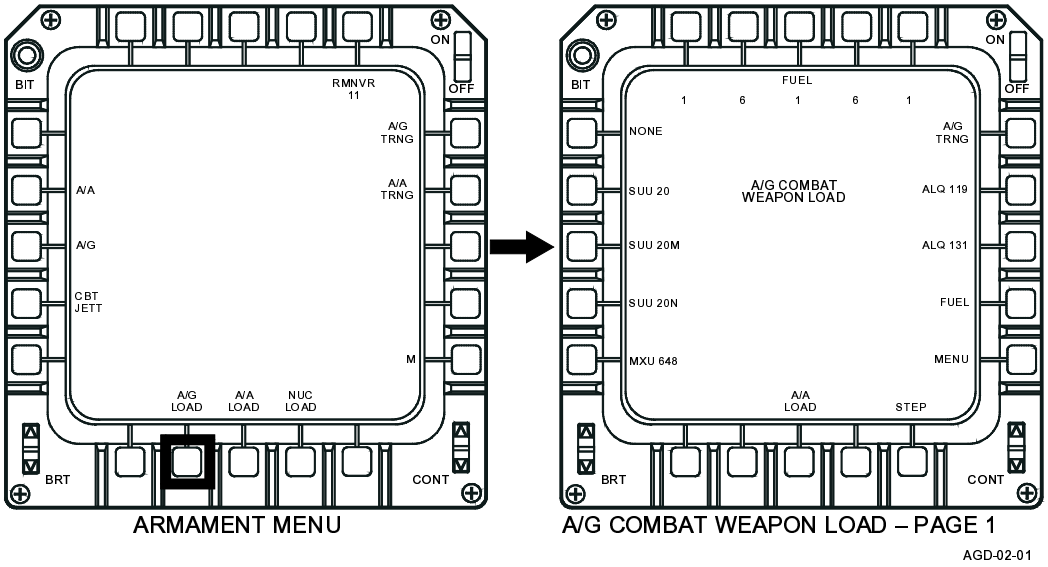


Figure D - 1. A/G Combat Weapon Load Format.

Stations and Quantities

The five air-to-ground weapons stations correspond to PBs #16-20 at the top of the display (Figure D-1). The number of munitions present on a station is automatically identified to the PACS. Some stores, like fuel tanks, self-identify their type. However, the crew normally has to identify other stores, either through MC/DTM programming or the PACS A/G LOAD format.

Loading Controls

On the A/G LOAD format, the legends opposite PBs #1-5 and #12-14 are the specific A/G munitions that can be loaded. Figure D-1 shows the options available in group 1. The load display will initialize to the group that was last viewed on for the previous mission. There are six groups (pages) containing all the munitions for which the PACS has a program. All six groups are listed in TO 1F-15E-34-1-1. Note the "NONE" by PB #1. It is used to clear legends under PBs #16-20 in the training mode. There are also three "SUU-20" legends; SUU-20M is for MK-106s (high drags), SUU-20N is for BDU-33s (low drags), and SUU-20 is programmable for a mixed load. SUU-20 dispensers are discussed in detail in AGW-1. Alternate depressions of PB #10 (STEP) pages through the six groups. From each A/G load display, it is also possible to change to A/A LOAD by pressing PB #8, enter the A/G TRNG mode by pressing PB #15, or return to the top level PACS menu by pressing PB #11. Entering NUC LOAD at PB #9 is possible only on the top level PACS menu.

Loading an A/G Store

To correlate information, here are the steps to program an A/G stores load. Assume there are two MK-84s onboard, one each on stations 2 & 8, and 12 CBU-58s, six on each CFT. When the aircrew brings up the A/G LOAD format (Figure D-2), the number is visible, but not the type of stores on stations 2, 8, LC and RC. Also visible is that a centerline fuel tank is loaded (fuel tanks self-identify).

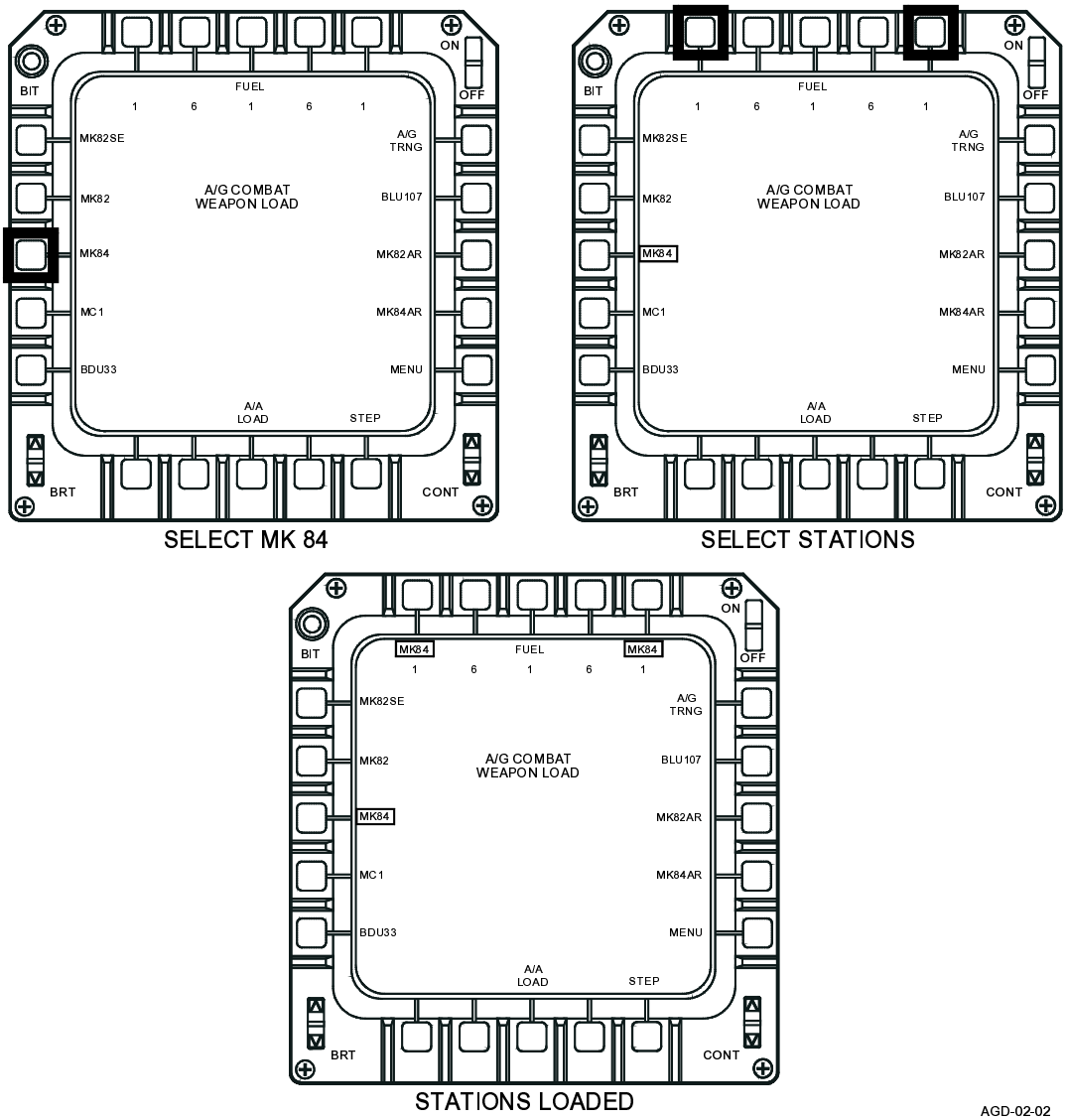


Figure D - 2. A/G Combat Weapon Load.

If the MC/DTM data was loaded before bringing up the display, the display would have initialized with the MC/DTM programmed legends. In this case, all the munitions previously loaded on the aircraft were dropped during the last mission, therefore the legends come up blank. When munitions are physically loaded on the aircraft, the PACS is able to sense the correct quantity of munitions, but not the correct type. For ballistics and OWS purposes, the PACS must be programmed with the air-to-ground munitions that are actually aboard the aircraft. This can be accomplished via a MC/DTM, or via the display itself. The MK-84s are in Group 4. Push the button beside MK-84 and a box appears around the legend. This shows that it is selected to load. Next, push PBs #16 and #20; a boxed MK84 appears below the buttons showing what is loaded on the stations. That is all there is to identifying dumb bombs to the PACS.

Loading a CBU/MK-20

Page 3 of the PACS weapons load menu lists all dispenser munitions certified for carriage on the F-15E (Figure D-3). To identify the stores actually loaded on a station, select (box) the store by pressing the push button next to the appropriate store legend and then press the appropriate station push buttons. In this example (Figure D-3), box CBU58 by pressing PB #13; then press PBs #17 and #19 to locate CBU58 on stations RC and LC. When a dispenser munition is selected and located on a station it initializes with the default fuze and settings (or AFMSS selected fuze and settings). At this point, the FUZE LOAD option appears at PB #7.

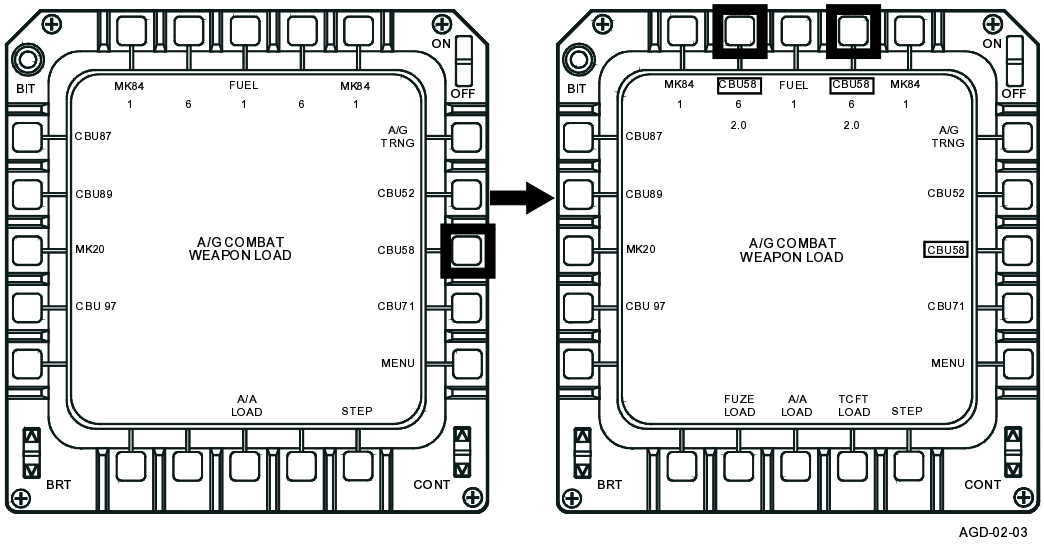


Figure D - 3. Loading a Dispenser Munition.

Pressing PB #7 brings up the FUZE LOAD page (Figure D-4). Fuzes compatible with the weapon are listed in the lower center of the display with the current selection boxed. Pressing PB #4 steps through the fuze choices. Selectable fuze settings are displayed between PBs #2 and #3 and/or between PBs #14 and #13. PBs #2, #3, #13 and #14 are used to increment or decrement setting values. Additionally, burst height and time can be entered by typing a valid entry into the UFC scratchpad and pressing the appropriate pushbutton (PB #2/3 or PB #13/14). After the desired fuze and settings are selected, selecting ENTER at PB #10 completes the programming. In the example, the default fuze for the CBU58 is the FMU26 with a 2.0-second timer. To select the FMU56, press PB #4 once. Since the FMU56 is a radar fuze, the altitude setting appears between PBs #13 and #14. After setting the desired altitude, in this case 250 feet, press PB #10 to enter the settings.

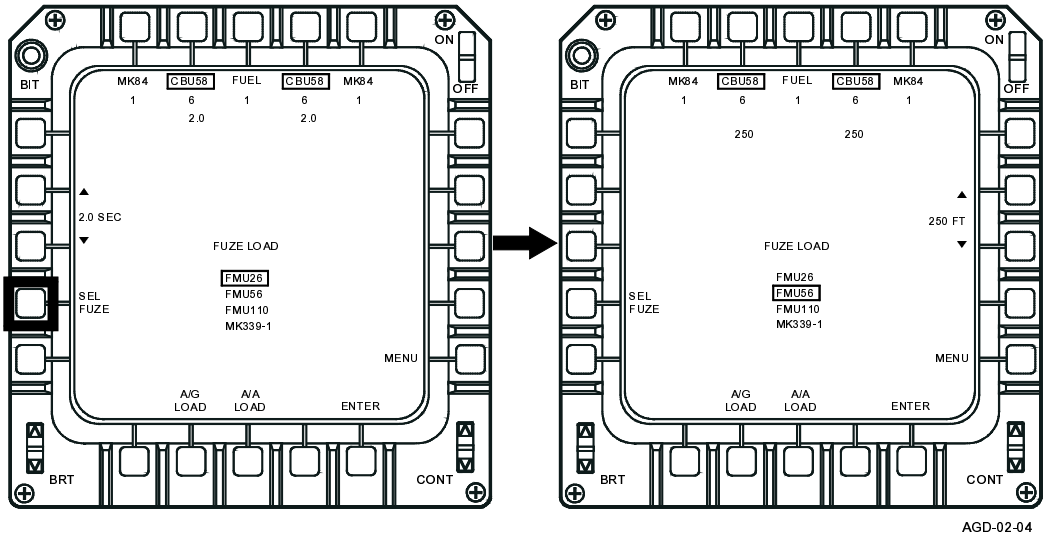


Figure D - 4. Fuze Load Options.

Fuze load options for the MK-20 and CBU-87 are shown in Figure D-5. These examples show the multiple settings required for these munition/fuze combinations. Note that in all cases, once entered with PB #10, the new fuze settings appear under the weapon/quantity at the top of the display.

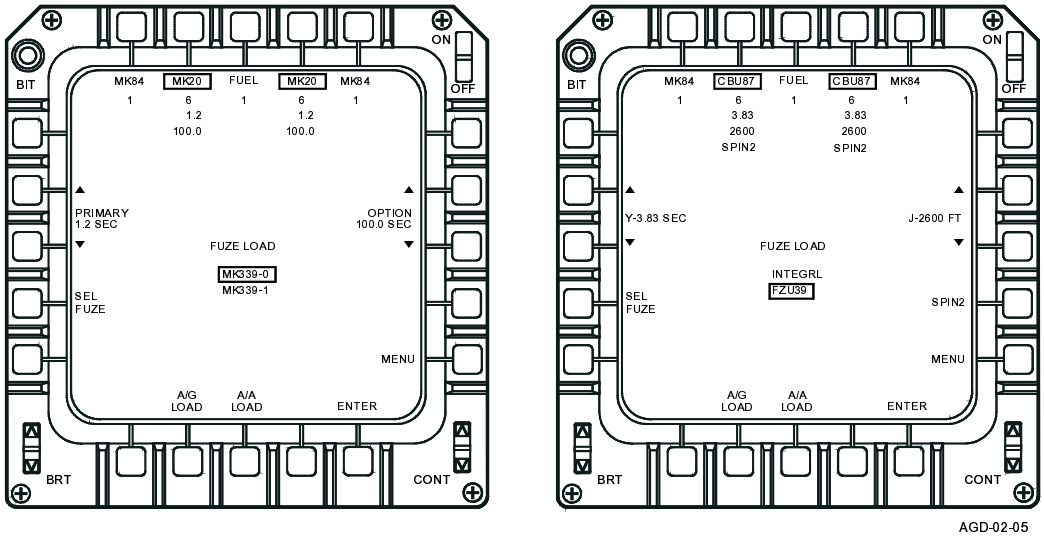


Figure D - 5. MK-20 and CBU-87 Examples.

Tangential Conformal Fuel Tank (TCFT) Stores

When a CFT store is detected in the PACS, TCFT LOAD is displayed at PB #9. After the weapon type has been identified and entered on the A/G LOAD display, pressing PB #9 selects the TCFT LOAD display (Figure D-6). The aircrew can now enter the exact CFT position of each store loaded on this display. This enables the CC to accurately determine CFT release sequence in order to apply the correct lateral ejection component, and provide the proper azimuth steering to compensate for lateral displacement of the weapon impact point(s) on the ground.

Stores entered on the TCFT LOAD display are also used for determination of laser masking zones.

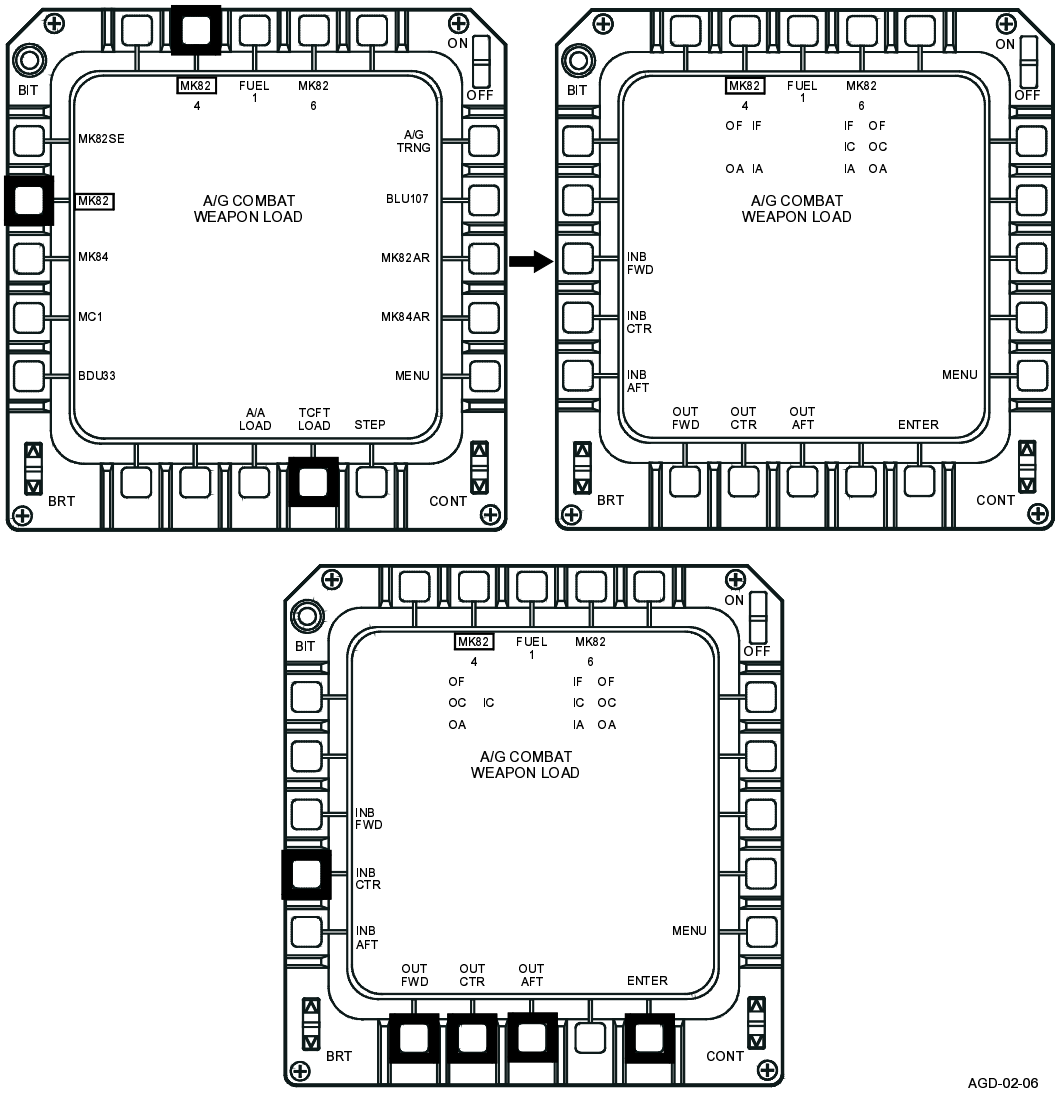


Figure D - 6. TCFT Load.

The aircrew selects each weapon load position by pressing the corresponding PB (Pushbuttons) listed in Table D-1 below on the TCFT LOAD display:

PB #	Corresponding TCFT Station
3	Inboard Forward (INB FWD/IF)
4	Inboard Center (INB CTR/IC)
5	Inboard Aft (INB AFT/IA)
6	Outboard Forward (OUT FWD/OF)
7	Outboard Center (OUT CTR/OC)
8	Outboard Aft (OUT AFT/OA)

Table D - 1.

The station position legend(s) are boxed when selected and are accepted when ENTER (PB #10) is depressed. The legend(s) is/are then unboxed and the station positions are displayed under the corresponding CFT weapon load (Figure D-6).

With the landing gear handle up, if the aircrew entered CFT position load does not agree with the PACS supplied quantity, the PACS overrides the aircrew entries in the following manner:

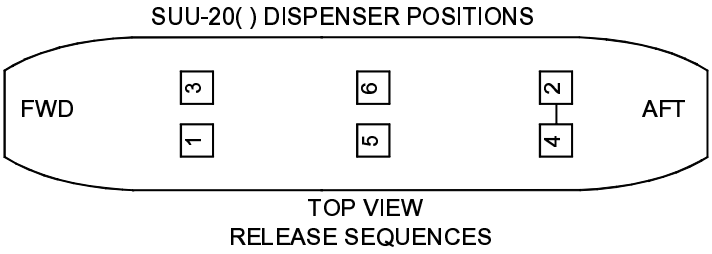
- If the aircrew entered too many CFT positions for the quantity determined by the PACS, the PACS removes the aircrew entered positions in the release order (IA, IF, OA, OF, OC and IC) until the quantity matches the positions.

- If the aircrew entered too few (or no) CFT positions, the PACS fills out the quantity with positions from the reverse release order.

Other Weapons Loading

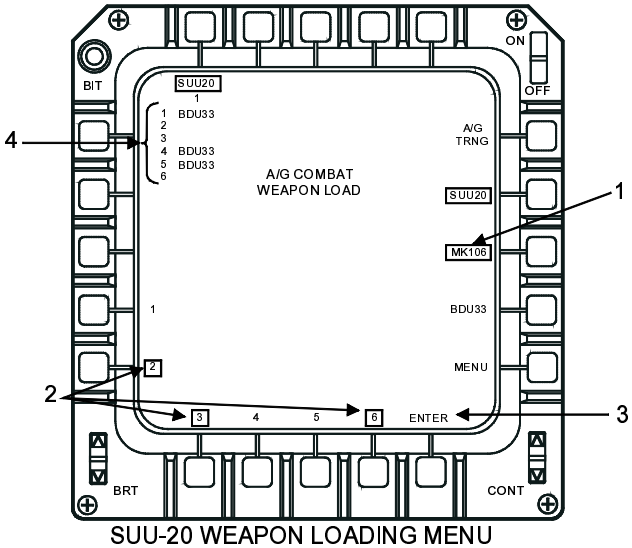
Other weapons or stores like AGM-65s, GBUs, ECM pods, etc., are covered in later, dedicated lessons. As mentioned previously, fuel tanks identify themselves to the PACS so the aircrew does not have to load them except in the training mode.

When loading a SUU-20, the aircrew must identify individual bombs (BDU-33 or MK-106) for each of the six SUU-20 positions. After loading a SUU-20 on the appropriate station, a bomblet submenu will appear as shown in the middle part of Figure D-7. The A/G weapon load menu for the SUU-20 displays the dispenser position numbers 1-6. To load a SUU-20, first select the type of bombs (MK-106 or BDU-33), then select the SUU-20 positions, then select enter. The type of bomb (BDU-33 or MK-106) should be displayed next to the desired position under the station where the SUU-20 is loaded. The aircraft PACS display tells the operator the SUU-20 bomb positions (1-6) and type of bomb in the release sequence. Note that the number of bombs remaining is not displayed; only the SUU-20 bomb position next in the release sequence and type of store loaded (Figure D-7).



SUU-20 WEAPON LOADING

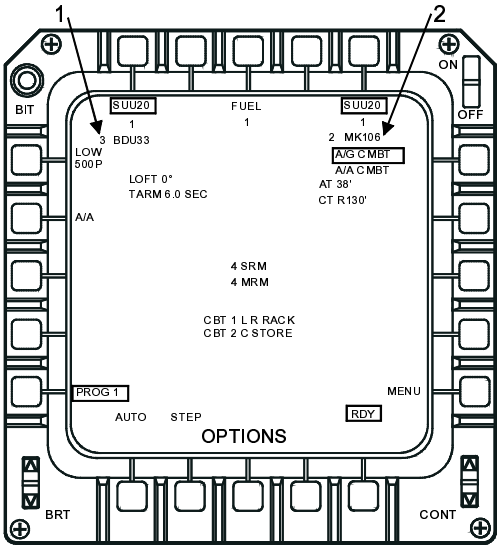
1. SELECT MK106 OR BDU33 TO LOAD.
2. SELECT POSITIONS FOR LOAD SELECTED.
3. ENTER.
4. POSITION LOADS ARE DISPLAYED UNDER SUU-20 STATION SELECTED FOR LOADING.



SUU-20 WEAPON LOADING MENU

A/G PACS DISPLAY

1. STATION 2 DISPLAYS A SUU-20 LOADED WITH A BDU33 AT DISPENSER POSITION 3 NEXT IN THE RELEASE SEQUENCE
2. STATION 8 DISPLAYS A SUU-20 LOADED WITH A MK106 AT DISPENSER POSITION 2 NEXT IN THE RELEASE SEQUENCE.



A/G PACS DISPLAY

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Figure D - 7. SUU-20 Loading.

The SUU-20M/N does not have mixed load capability like the SUU-20B/A. With the SUU-20M loaded, the PACS initializes with 6 x MK-106s per dispenser; with a SUU-20N loaded, the PACS initializes with 6 x BDU-33s per dispenser. The display on the A/G status menu is identical for both SUU-20M/N and SUU-20B/A. The only difference is bomb types associated to the SUU-20 itself.

A/G WEAPON STATUS AND RELEASE PROGRAMMING

Once the munitions are loaded in the PACS, call up the A/G display to program delivery functions and to monitor status. To do this, go back to the menu and press PB #3, A/G. The resulting A/G display is shown in Figure D-8.

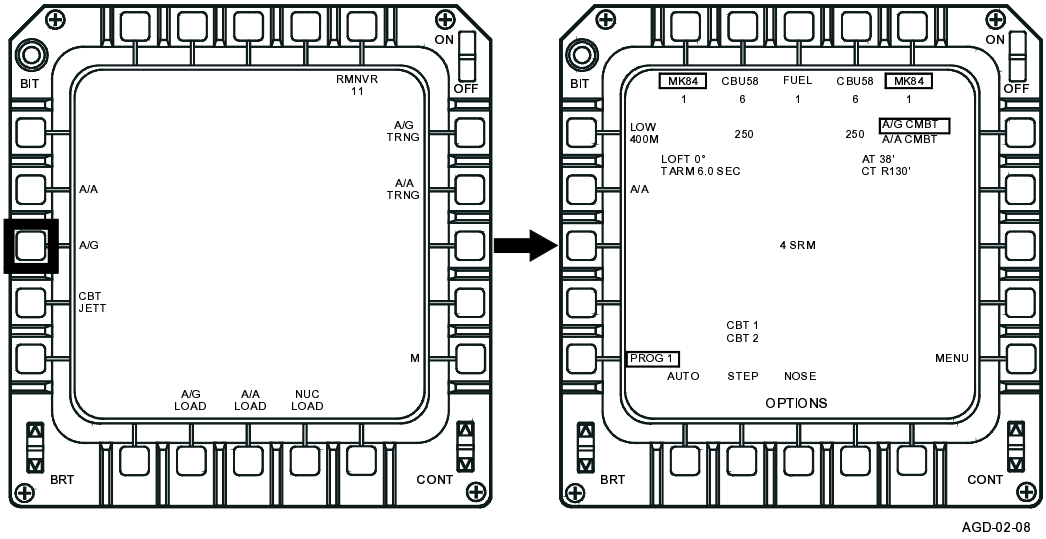


Figure D - 8. A/G Display.

At the top are the munitions/stores loaded into the PACS, including dispenser program information, if appropriate. Next to PB #1 is the gun data, including firing rate and number of rounds remaining. It is programmed on the A/A LOAD display; however, the firing rate can be changed here by alternate depressions of PB #1. Below that is A/A; by pressing PB #2, it is possible to go directly to the air-to-air PACS display. In the middle of the display is a readout of the A/A missiles on board, showing SRMs that are not HUNG and MRMs that are in STBY or RDY.

Beside PB #5 is the delivery program option legend. A program consists of the desired weapon delivery parameters and release options. The display always initializes to the program option last displayed; depressing PB #5 cycles through the four program options. Program the delivery options by first calling up the desired program number and then boxing the appropriate munitions. In Figure D-9, the MK-84s on stations 2 and 8 are assigned to PROG 1. The release options that the crew has are release mode, release sequence, and drag/fuze arming. Whatever is in CC memory will be what is initially displayed.

To change a release option, depress the button below it; this blanks out the legend and brings up the choices for that option at the bottom of the display. Figure D-9 shows this for the release mode options. Then by pressing the button below the choice, CDIP or AUTO, enter it into PROG 1 and the display changes back, showing the new option, ready for more programming.

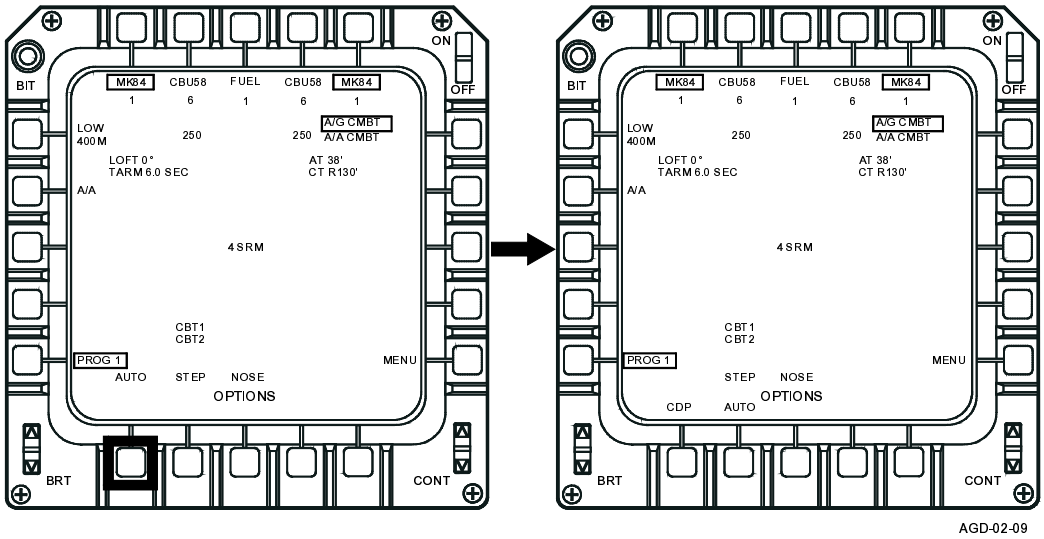


Figure D - 9. Delivery Mode Programming.

The options available and their explanation are given below.

RELEASE MODE (PB #6)

DIRECT — the pilot must achieve preplanned release parameters appropriate for the mil setting entered through the UFC. The direct mode is available only with a SUU-20 or GBU 24/28 selected.

AUTO — automatically releases munitions, with switches properly set, when aircraft slant range from the target equals CC computed delivery slant range.

CDIP — continuously displayed impact point: allows the pilot to put the reticle on the target visually and initiate a computed delivery.

RELEASE SEQUENCE (PB #7)

1/STA — one weapon is released from each selected station each time the pickle button is pressed.

STEP — one weapon is released each time the pickle button is pressed. If more than one station is selected, the release signals are sequenced as follows: LC, RC, 2, 8, 5, LC, etc.

RP SGL — ripple single: with the pickle button depressed, weapons release continuously, one at a time, at the set interval until the quantity selected on the quantity indicator has been released. If more than one station is selected, the sequence follows that in the STEP program.

RP MPL — ripple multiple: with the pickle button depressed, one weapon is released from each selected station simultaneously and continues at the selected interval until the selected quantity has been released. If only one station is selected, the mode works the same as ripple single.

When either RP SGL or RP MPL is selected, the quantity (QTY) and interval (INTVL) are displayed (Figure D-10). To change the quantity of bombs to be released, use alternate depressions of PB #3 for the unit's digit and PB #4 for the ten's digit. Any number from 01 through 29 may be used. The minimum release interval is weapon dependent (i.e., the CC or PACS will ultimately determine the interval at which weapons are released). If you program a weapon release interval less than the MRI, the weapons will be dropped at the PACS or CC determined minimum release interval. Refer to TO 1F-15E-34-1-1, A/G bombing, minimum release interval. Now program the desired interval (feet between impacts). Use PB #12 to change the ten's digit and PB #13 to change hundreds. The stick length (first bomb to last bomb) for Figure D-10 is 150 feet.

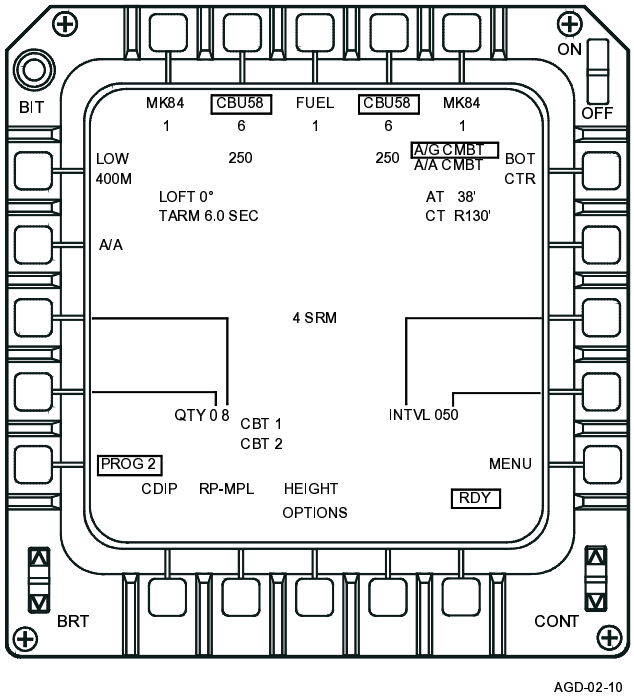


Figure D - 10. QTY/INTVL Options.

The cross and along track corrections, loft angle and arming time are set through the A/G delivery display on the MPD/MPCD. Note that each PACS program has its own set of A/G delivery parameters. After exiting a specific PACS program and entering another, the desired loft angle, cross/along track corrections must be entered for the new program.

After completing a delivery program, the three remaining programs may be used for the remaining munitions or to establish an alternate release program for the ones just set up. When finished, stay in the A/G display or exit to something else. There is no harm in leaving one or more delivery programs blank.

As stated earlier, the PACS is smart and will keep the crew from making many programming errors. For example, assume there are MK-84s on station 2 and MK-20s on the left CFT. If the pilot tries to assign both of them to the same program, as soon as the second munition is boxed, the boxes will disappear. This should alert the pilot to the mismatch.

DRAG/FUZE OPTIONS (PB #8)

NOSE	the nose and center arming solenoids are energized at release.
TAIL	the tail arming solenoid is energized at release.
N/T	nose/tail: all three solenoids are energized at release.
PRIMARY	for use with MK-20 and CBUs with MK-339 fuze; selects nose arming unit at release.
OPTION	for use with MK-20 and CBUs with MK-339 fuze; selects nose/tail arming at release.
TIME	CBU with fuzes other than MK-339; selects nose arming unit at release.
HEIGHT	CBU with fuzes other than MK-339; selects nose/tail arming at release.

Some weapons can be wired to provide the option of selecting the type profile after airborne, either low drag or high drag. In these cases, for MK-82SE, MK-82-AR, and MK-84/AR the nose option selects both the nose and center arming units and the low drag options. The tail or N/T option selects either the tail or all three arming units, respectively, and the high drag option. For the BLU-107, only the nose option is available; this option selects both the nose and center arming units and the high drag option.

The A/G PACS display with dispensers loaded and programmed is shown on Figure D-11. In display A, CBU-52s are loaded and selected with the MK-339-1 fuze options of PRIMARY and OPTION available at PBs #6 and #7. In display C, CBU-87s are loaded and selected with the FZU-39 fuze options of TIME and HEIGHT available at PBs #6 and #7. Choosing one of the options at PB #6 or #7 selects the fuzing as programmed on the FUZE LOAD display. Display B reflects the OPTION setting being selected for the CBU-52s, and display D indicates the TIME function was selected for the CBU-87s.

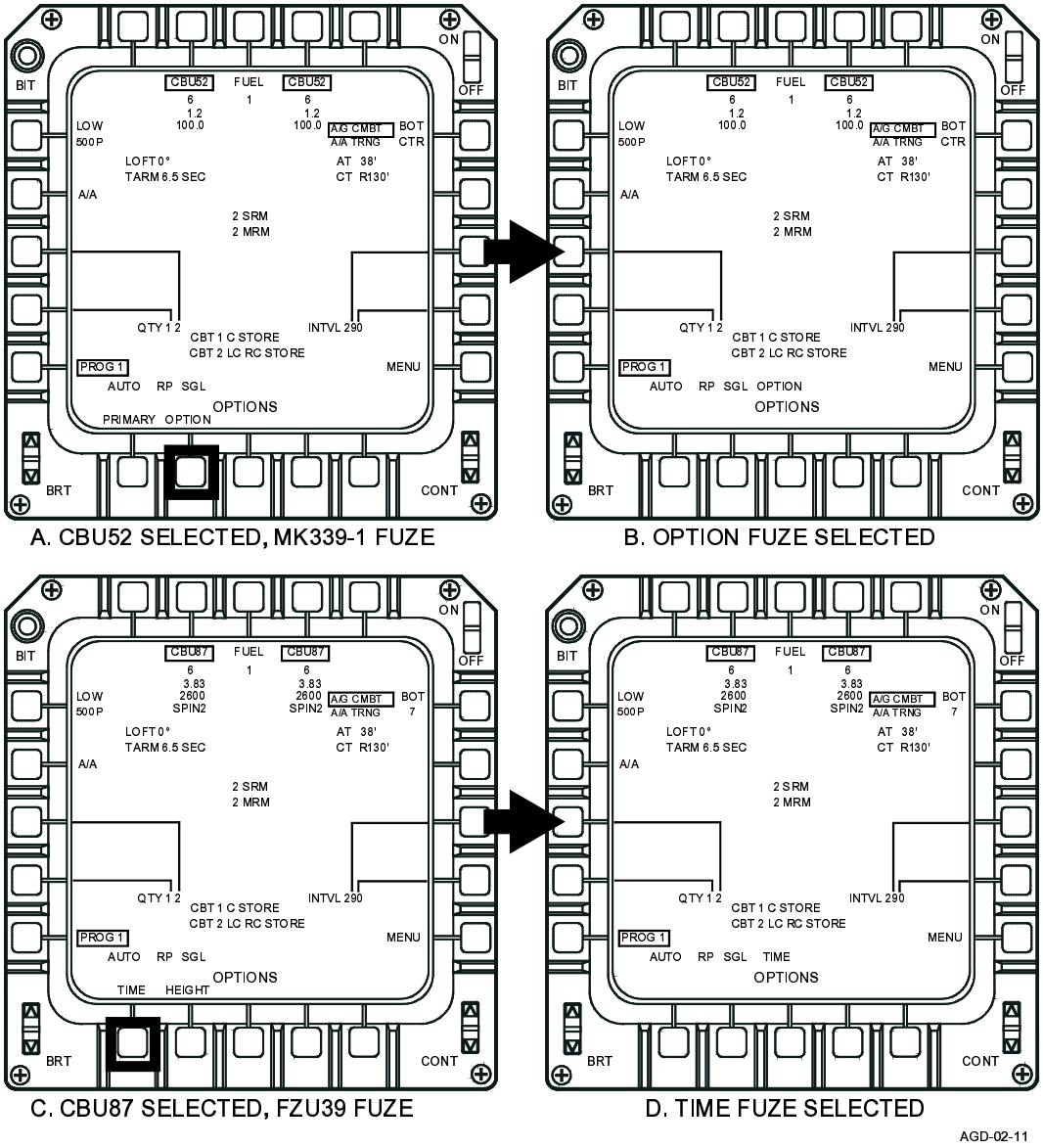


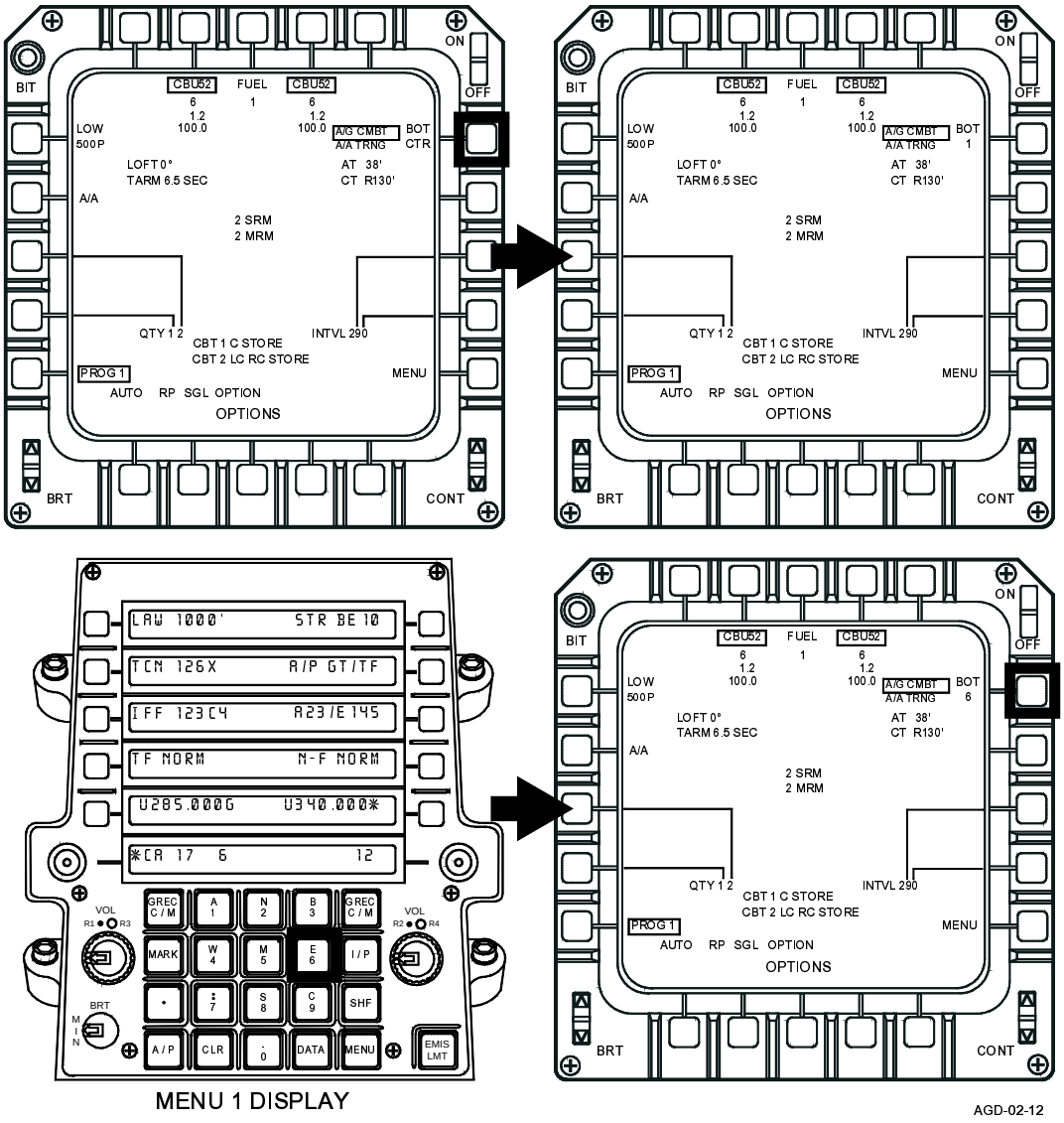
Figure D - 11. CBU Fuze Options.

Bomb on Target (BOT)

For each delivery program (TRNG and CMBT) with a ripple delivery and a quantity (QTY) greater than 1 selected, a BOT selection is available at PB #15 (Figure D-12). The BOT initializes to the center of the string (CTR). The first actuation of PB #15 advances the BOT to the first bomb in the string. Each successive actuation increments the value by 1 until the selected release QTY is reached. When the BOT number equals the selected release QTY, the next actuation returns to CTR. If the selected QTY is changed and increased, the BOT is not affected. If the new QTY is decreased to less than the current BOT, the BOT defaults to CTR.

The BOT can also be entered through the UFC. If 0 is selected on the scratchpad and PB #15 is pressed, CTR is selected. If a number between 1 and the selected QTY is entered in the scratchpad and PB #15 is pressed, that number is displayed below the BOT at PB #15. If the selected QTY is greater than the total number of bombs loaded on the selected stations, that QTY number is displayed at PB #15, but all station and position on target information is for the last bomb on the string. If a number greater than the selected release QTY, or less than 0 is entered via the scratchpad, the number in the scratchpad flashes and the BOT number at PB #15 does not change.

With an even number of bombs in the string and CTR selected, the target will be bracketed by the two middle bombs in the sequence. With an odd number of bombs, the middle bomb will be on target.



MENU 1 DISPLAY

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Figure D - 12. BOT Display.

Releasing a Weapon

The pilot or WSO will probably not fly around all the time with a PACS format on one of the displays. So, when ready to drop bombs, bring up the A/G PACS display (as a technique, many aircrew program an ARMT page to the A/G master mode on one display). When it initializes, verify the correct program number is showing. Insure that A/G master mode is selected, then put the MASTER ARM switch to ARM. This satisfies all the logic required by the PACS for delivery. A boxed RDY appears on the display (Figure D-13) and the MASTER ARM light on the RCP caution panel illuminates. The last step is to press the pickle button. Do not quick pickle; both computed modes use the pickle button as a consent switch. Immediate release will not occur in AUTO and may not occur in CDIP.

NOTE

Although it is not absolutely necessary to have the A/G PACS display called up, it is the only way to change intervals, weapons and delivery options. Programs may be changed and the green "RDY" light status verified on both the A/G PACS and the A/G Delivery Display.

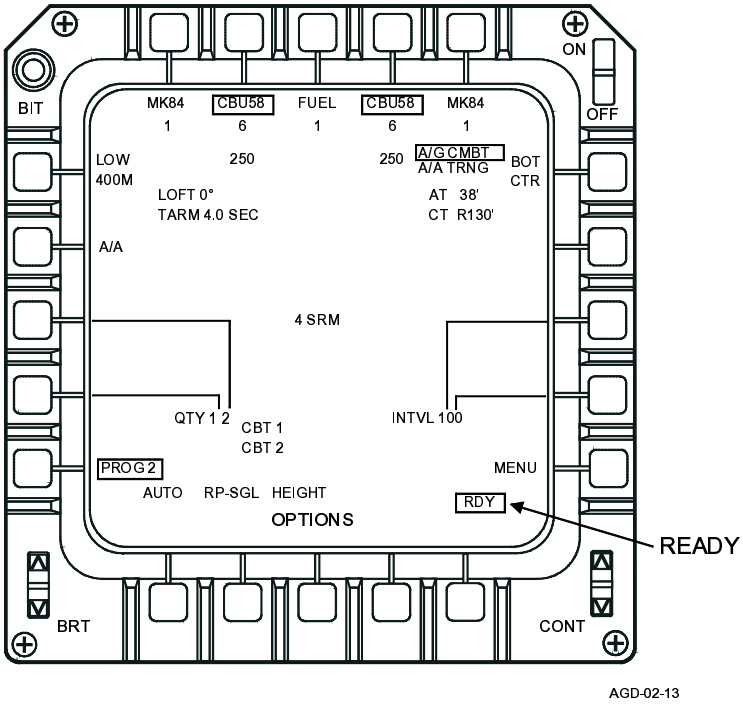


Figure D - 13. Ready.

As munitions are released, the stores aboard sensors keep track of the quantity and update the display. However, these computations are not instantaneous; it is possible for the OWS to register an over-G condition while pulling off target based on stores you have already released. When all weapons on a station are gone, the weapon legend is erased and replaced by what is left, i.e., RACK, PYLON, or blank if nothing is there. If a release signal is sent to a pylon or rack station and a store present indication is still there after the signal is removed, a HUNG legend will appear. However, in the case of the rack, this does not occur until all subsequent stores have been sent a release signal.

A/G TRAINING WEAPONS MODE

The PACS training mode works in both A/A and A/G, giving the capability to simulate any weapons delivery with or without stores actually loaded aboard. However, the training mode may not prevent the release of real ordnance (live or inert). The A/G TRNG mode should not be used when carrying releasable stores. The A/A TRNG mode may be used when carrying certain releasable stores; restrictions will be discussed in your flight briefings.

The A/G training mode can be entered anytime "A/G TRNG" shows beside PB #15. First press PB #15 with the top level PACS menu showing. This boxes A/G TRNG, enabling the A/G training mode (Figure D-14).

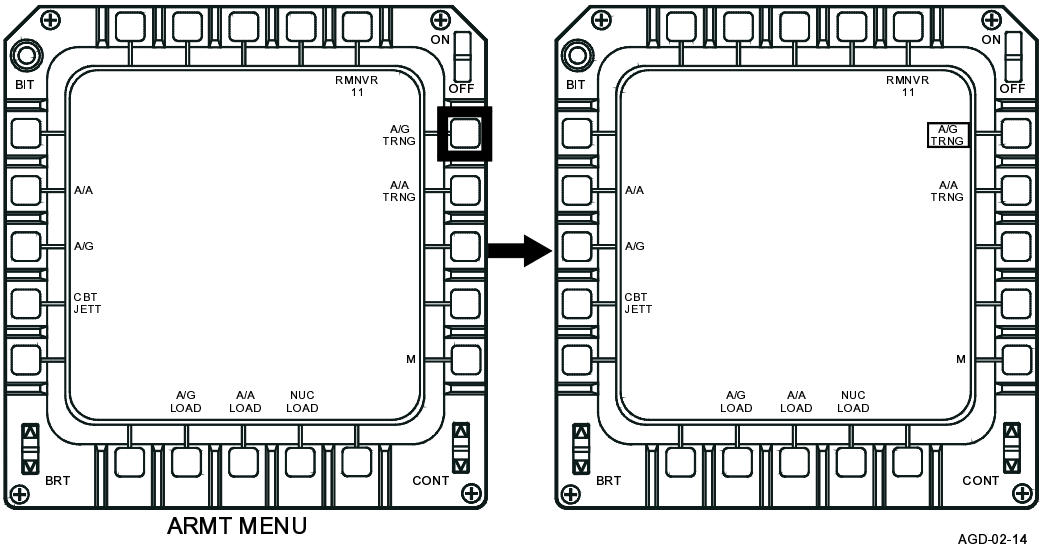


Figure D - 14. A/G Training Mode.

Next, press PB #7, A/G LOAD. All these displays look just about the same as the actual weapons' displays except that the A/G TRNG legend is boxed and the page title shows “A/G Training Weapon Load.” Once in A/G LOAD, program munitions/stores as desired; the range of choices is made available by paging through the groups with the STEP button. The operation is done just as explained previously for actual A/G weapon programming.

In A/G TRNG, whenever a munition or store is programmed, its quantity initializes to the maximum number that can be carried on that station, i.e., six MK-82s on station 2. Cycling PB #6, DECR QTY (a training only legend), decreases the quantity of each boxed munition by one (Figure D-15). Depressing the button with “1” showing takes the quantity back to the maximum.

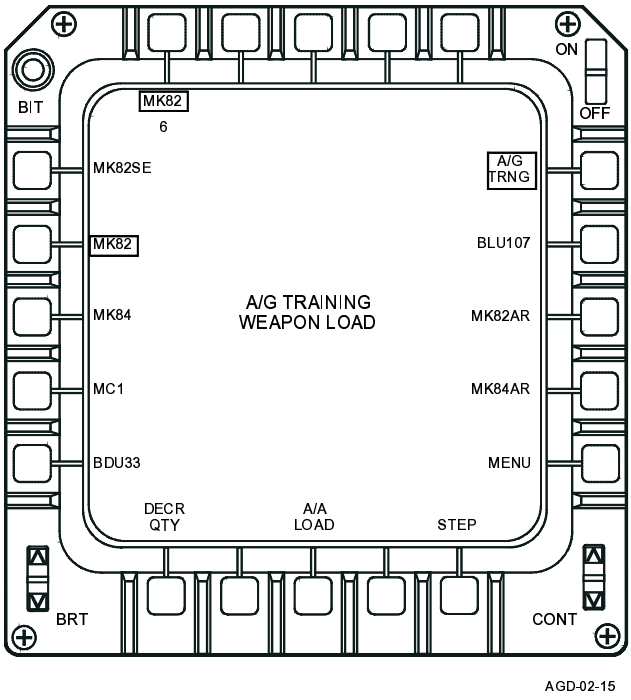


Figure D - 15. Training Quantities.

Once the A/G training load is programmed, exit by pressing the menu button, which takes you back to the top level PACS menu. Now go to the A/G TRNG display by selecting A/G. There will be a display like Figure D-16, which again looks almost exactly like the real A/G display. Set up release programs, monitor status, release simulated weapons, and when the stations indicate empty, just press the RESET button and the training load reinitializes. Notice that A/G TRNG is boxed showing the PACS is in the training mode and not dropping actual weapons.

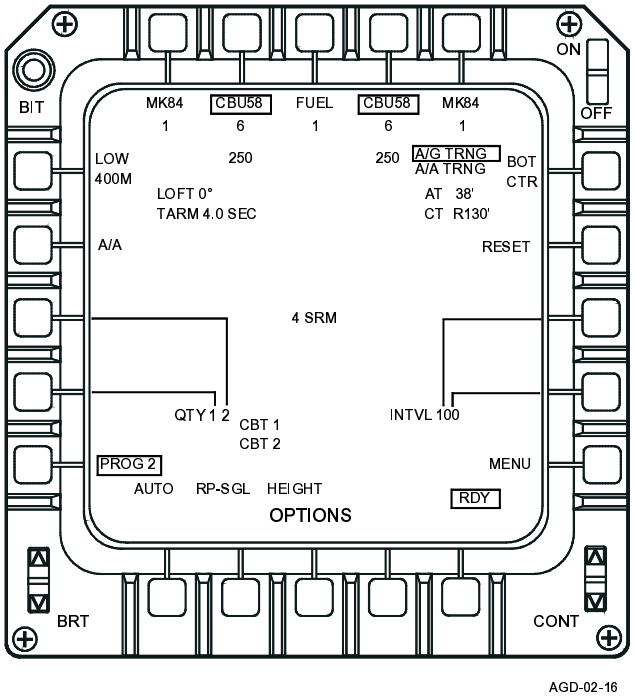


Figure D - 16. A/G Training Mode.

At any time, it is possible to change to the A/A TRNG display by pressing PB #2, or return to the top level PACS menu by pressing PB #11. When the PACS is in the training mode, TRNG appears in window 21 of the HUD. If you want to transition to the A/G CMBT mode, deselect PB #15 (A/G TRNG) on the top level PACS menu.

QUESTIONS

1. The stations on the F-15E that can carry and release A/G weapons are __, __, __, __, and __.

2. To go from the menu display on an MPD/MPCD to a PACS display, press PB #2, labeled _____.

3. With electrical power, pushing the emergency jettison button while on the ground will/will not jettison stores. (choose one)

4. The PACS data on which external stores are loaded is used by the OWS for _____.

5. After six release pulses have been sent to a SUU-20N, its quantity legend on the A/G display _____.

6. You can set up as many as ____ program option(s) for releasing A/G weapons.

7. To enter the A/G training mode press the button next to the _____ legend on a PACS display.

Use Figure D-17 for questions 8-10.

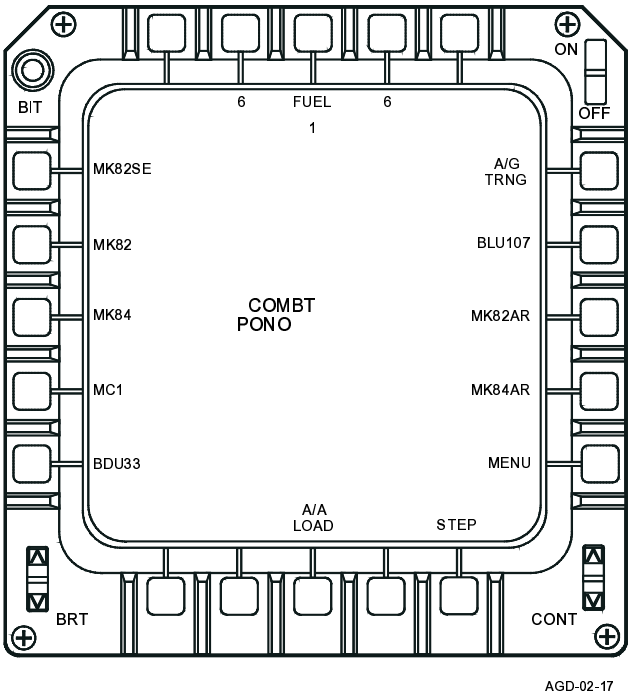


Figure D - 17.

8. The first step in loading MK-82SE on stations LC & RC is to _____.

9. The STEP PB, #10, is used to _____.

10. The FUEL legend below PB #18 shows that _____.

ANSWERS

1. 2, LC, 5, RC and 8
2. ARMT
3. will
4. computing maximum allowable G and over-G warning information
5. remains “1”
6. 4
7. A/G TRNG
8. press the button beside MK-82SE, PB #1
9. step through the five weapon groups for A/G loading
10. a fuel tank is loaded on the centerline station

JETTISON AND MANUAL RELEASE

Selective Jettison

The PACS has several ways to jettison A/G stores from the aircraft, which in all cases come off unarmed. For the circuitry to work, the pylon, rack or CFT Bomb Release Unit (BRU) must have ejector carts installed; otherwise, the firing signal is sent, but nothing happens. In addition, the landing gear handle must be up or the armament safety switch in OVERRIDE for the selective jettison circuits to be energized. Nuclear weapons cannot be jettisoned using the combat jettison (CBT JETT) options. When presented on an MPCD, the jettison symbology is colored blue for discrimination.

NOTE

> The combat jettison program is displayed in training and is reprogrammable for the training mode display. However, when CBT JETT is performed, the system exits training mode and jettisons actual stores loaded and programmed in the nontraining mode.

Combat Jettison

The two combat jettison options give a preprogrammed means to selectively jettison a part of the A/G load (including fuel tanks) and retain the rest. This could be very handy if you are intercepted en route to the target and need to run or fight but want to retain some air-to-ground capability.

To program the combat jettison options, press PB #4, CBT JETT, on the top level PACS menu. This brings up the combat jettison programming display (Figure D-18). The display shows the stores loaded and any previously programmed options beside CBT 1 and CBT 2. In the example below, nothing is programmed.

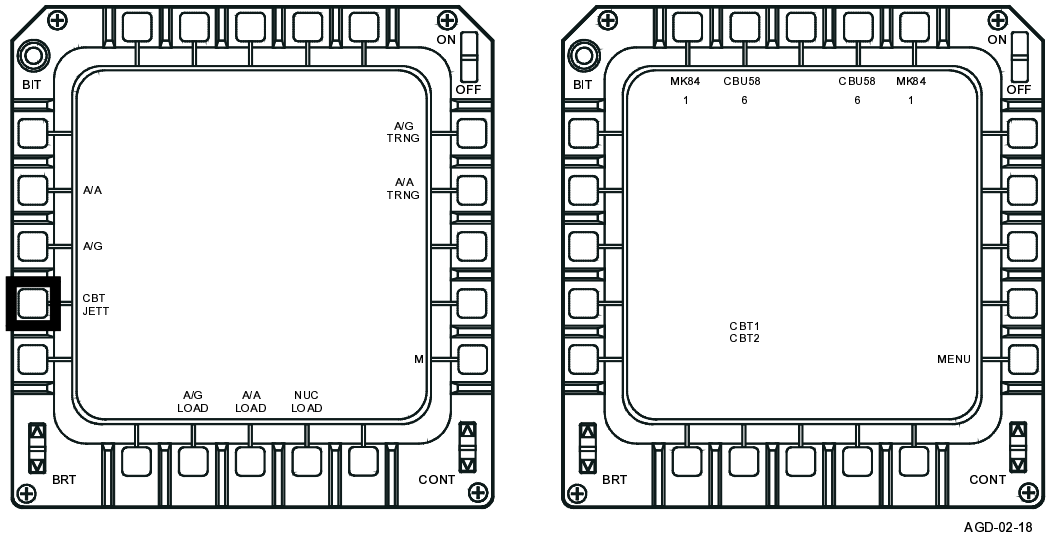


Figure D - 18. CBT JETT Programming Display.

Boxing a station calls up 1 and 2 legends at PB #6 and PB #7, respectively. To enter or change a program, press PB #6 or #7, which boxes the number above it, showing the selection as in Figure D-19 (1). Press the button(s) above the station(s) to be included in the jettison program (2). If making a change, also unbox the unwanted station(s). Next, choose RACK, STORE, or PYLON (they are mutually exclusive) (3). These options and their function are detailed below.

RACK — Jettisons whatever is loaded on the pylon, i.e., a single bomb, a bomb rack (multiple ejector rack - MER; or triple ejector rack - TER).

STORE — Jettisons a single store from a pylon or ripple jettisons stores from a bomb rack at 66 ±6 ms intervals (the rack remains) or ripple jettisons the stores from a CFT.

PYLON — Jettisons the pylon with anything attached to it.

The last step is to press the ENTER PB (4) which updates the program and displays the choices selected for that program beside the appropriate CBT legend (5). To exit the combat jettison programming mode you must press PB #11 and return to the top level PACS menu. The combat jettison program legend is also displayed on the A/G and A/A displays for quick reference.

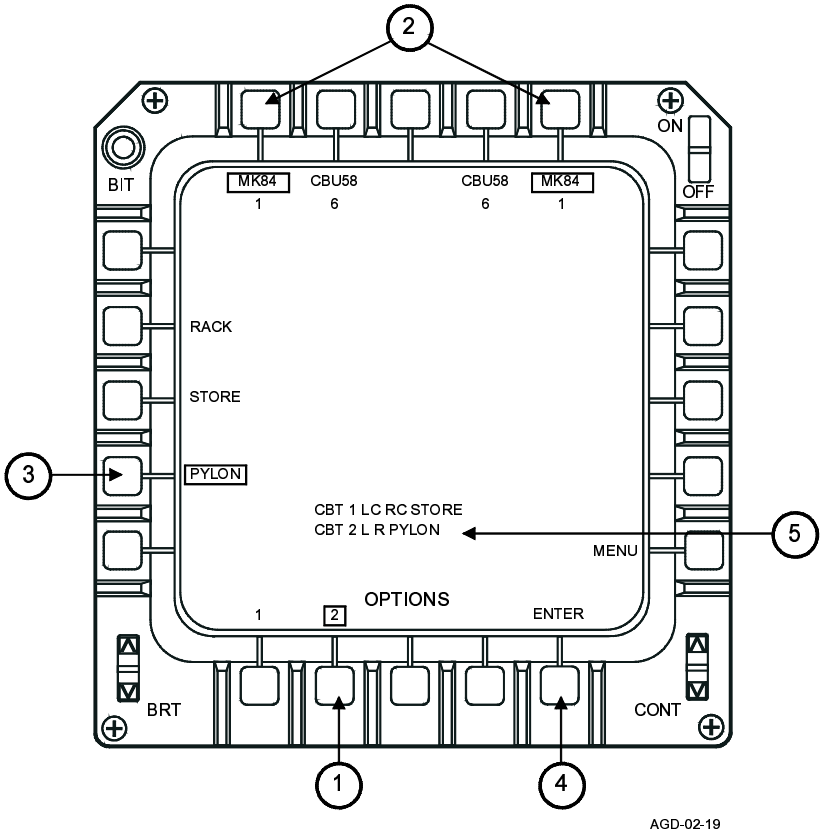


Figure D - 19. CBT JETT Programming.

To perform a combat jettison operation (landing gear handle up or armament safety switch in OVERRIDE), the pilot places the selective jettison knob on the armament control panel to COMBAT. This action boxes CBT 1 and CBT 2 on the A/G or A/A display to indicate the selection (Figure D-20). Then by pressing the selective jettison button once, the stores in the CBT 1 program are jettisoned. The second depression of the button jettisons the stores in the CBT 2 program. The station inventory is updated after each release. Keep the jettison button depressed until all selected stores are jettisoned.

If the jettison knob is rotated back to the off position after the CBT 1 stores are jettisoned, the program will re-initialize to the CBT 1 program; two depressions will then be required to jettison the CBT 2 stores.

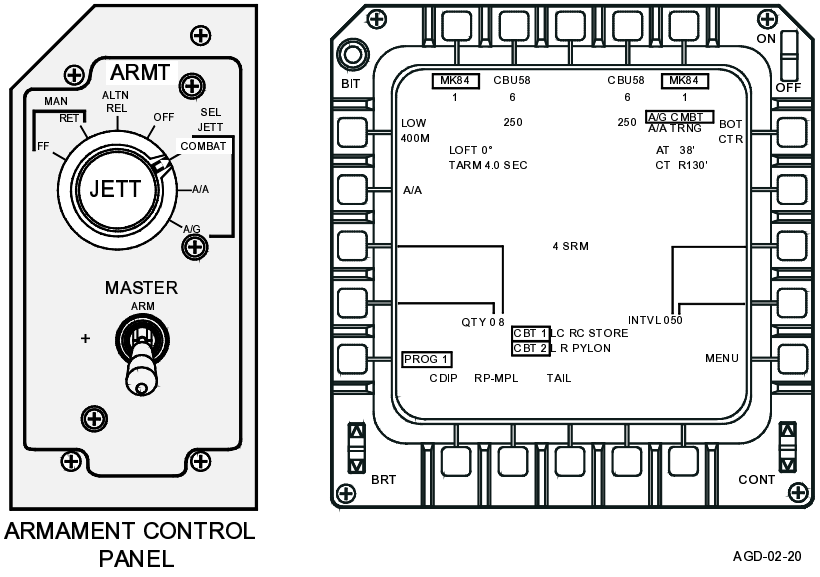


Figure D - 20. Combat SEL JETT.

It is possible to program combat jettison options in the training mode. However, do not attempt to exercise the options because selecting a jettison option with the jettison knob results in the system exiting the training mode making the jettison button HOT for actual stores jettison.

A/G Selective Jettison

Another way of getting rid of on-board stores is by using the A/G or A/A selective jettison options. By placing the selective jettison knob to either A/G or A/A, the A/G or A/A selective jettison display is called up on any MPD/MPCD that has a PACS format displayed and on the FCP MPCD. The A/G format is similar to the combat jettison programming format; the "A/G JETTISON" legend verifies which display the pilot has selected (Figure D-21).

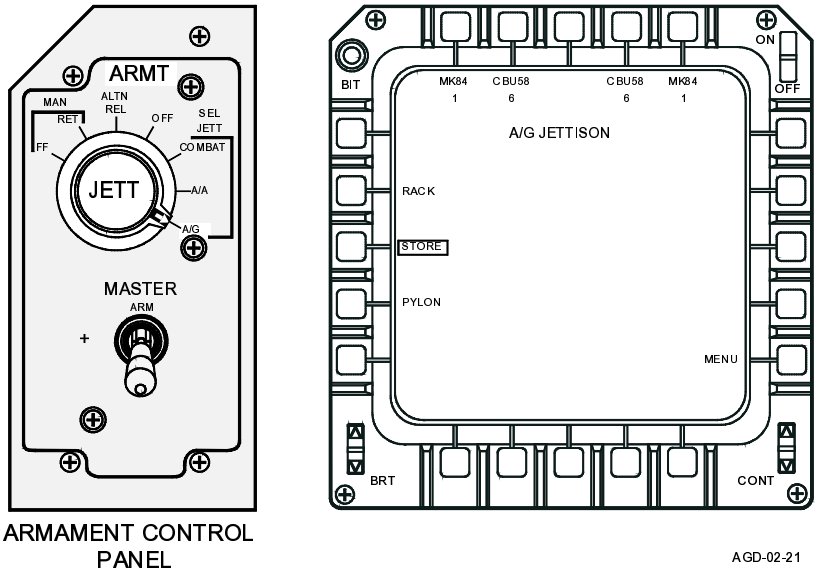


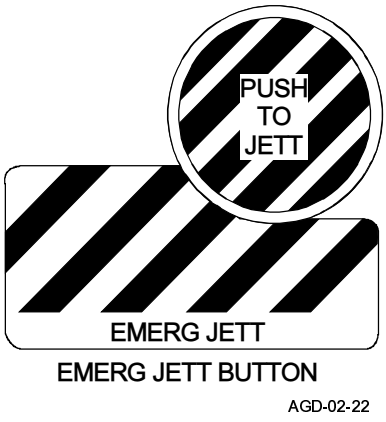
Figure D - 21. A/G SEL GETT.

The stores loaded are shown at the top and the appropriate suspension option is boxed. If there are single stores or stores on racks on board, it initializes to STORE, as indicated by it being boxed. If empty racks remain, it initializes to RACK, and if only empty pylons are installed, it goes to PYLON. Select the option desired, if different than the one boxed, and then select the item(s) you want to jettison by pressing the adjacent button. With the landing gear handle up or the armament safety switch in OVERRIDE, press the selective jettison button and, after a 65 ms delay for safing, all boxed items should depart the aircraft. If a CFT station and the wing station next to it are both selected, the CFT stores are jettisoned first, followed about 65 ms later by the other station. The store type and quantity readouts are also updated. When the jettison operation is complete, move the knob back to OFF and displays return to the original presentation. CFT stations are jettisoned sequentially. Keep the jettison

button depressed until all stores are jettisoned. Selective jettison for A/A and nuclear weapons is covered in other lessons.

Emergency Jettison

If the need arises to jettison all carted stores, racks and pylons from the aircraft immediately, the emergency jettison circuitry is the way. Keep the jettison button depressed until all stores are jettisoned (Figure D-22). During emergency jettison, bomb pairs are jettisoned from each CFT (two bombs from LC and two from RC) when the CFT releases occur. With the CFT fully loaded, the bomb pairs are positions 1/4, 3/6, and 2/5. The pairing may be affected if the CFT is not fully loaded. The interval between releases of bomb pairs from a CFT is 140±20 msec. Emergency jettison pulse timing is as follows:



EMERG JETT Button Pressed

35±5 msec	(delay)
35±5 msec	Station 5 (pylon eject)
35±5 msec	(delay)
35±5 msec	CFT stations (MRM eject/ ESU MAU store release)
35±5 msec	(delay)
35±5 msec	Stations 2, 5, 8 (pylon eject)
35±5 msec	(delay)
35±5 msec	CFT stations (MRM eject/ ESU MAU store release)
35±5 msec	(delay)
35±5 msec	Station 2, 5, 8 pylon eject
35±5 msec	(delay)
35±5 msec	CFT stations (MRM eject/ ESU MAU store release)

Figure D - 22. Emergency Jettison.

The following includes two exceptions that will not be jettisoned:

1. pylons and CFT stations without ejectors carts installed, and

2. nuclear weapons with their BRUs locked.

It is important to remember that any time internal or external power is applied to the aircraft, the emergency jettison button is hot.

Manual Release

In case certain malfunctions in the PACS system do not allow normal deliveries, there are backup means of releasing A/G weapons armed. Two positions on the armament control panel, MAN FF and MAN RET, bypass many computer and display circuits giving both a free fall and retarded manual delivery capability.

MAN FF - manual freefall position selects a manual store release and nose-only fuzing option. While the pickle button is held down, a release pulse train of 35 ms on and 35 ms off is generated (one pulse every 70 ms). Each pulse releases one weapon from each selected station (Figure D-23).

MAN RET - manual retard position selects a manual store release and tail only fuzing. The release pulse train is 115 ms on and 115 ms off (one pulse every 230 ms); each pulse releases one weapon from each selected station while the pickle button is depressed.

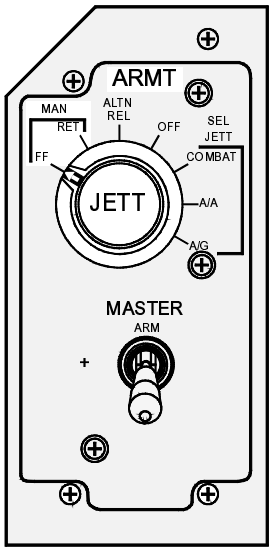


Figure D - 23. Manual Release Option.

Before ordnance can be released, it is necessary to be in the A/G master mode. When selecting MAN FF or MAN RET, all PACS displays in both

cockpits change to the main menu with ARMT missing at PB #2, except for the FCP MPCD which changes to the format in Figure D-24. It is the only display on which selections can be made.

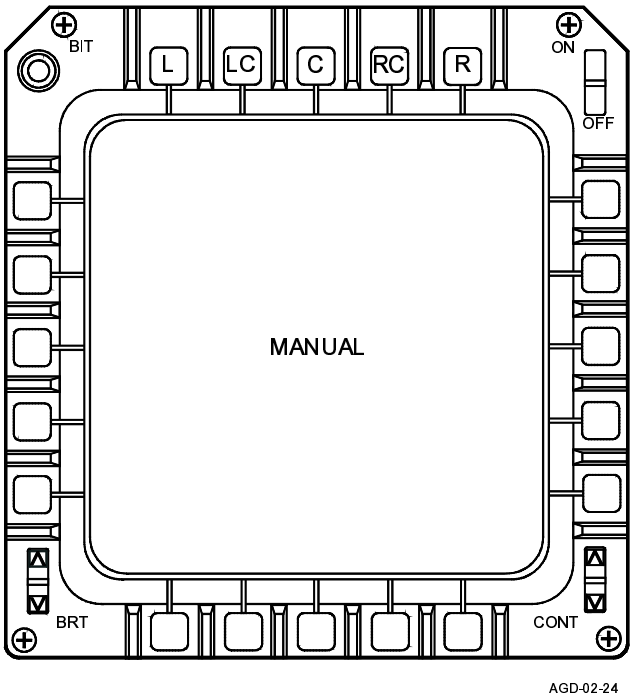


Figure D - 24. Manual Release Display.

Select the station(s) for release by pressing the appropriate PB (#16-20). In the manual mode, the buttons are backlighted so the legends, as in Figure D-24, appear at the first depression to show the selection. A second depression deselects the station and blanks the button legend. To release the store(s), place the master arm switch to ARM and hold down the pickle button. When selecting OFF on the selective jettison knob, the manual PACS display returns to the original presentation.

DEGRADED OPERATION

As described, the PACS has a lot of capability to deliver A/G weapons in many combinations and configurations. When certain components of the PACS or related systems fail, some capability is lost but, in most cases, a backup exists. The following information addresses a complete failure of the particular item; partial failures probably will leave some reduced capability in the PACS area affected.

Central Computer Failure

If the CC fails, the program functions of the PACS are lost. However, A/G weapons can still be released using MAN FF or MAN RET and A/G selective jettison and emergency jettison can be performed.

Multipurpose Display Processor

The MPDP processes the display signals. If it fails, all MPD/MPCDs appear blank. Manual release modes can be commanded from the FCP MPCD and emergency jettison is still available.

MPD/MPCD

If only an individual MPD or MPCD fails, the desired PACS display can be called up on another one in either cockpit and all functions are available. However, if the FCP MPCD goes completely dead, the manual modes cannot be used.

Armament Panel

If the armament panel fails, all normal PACS functions are available except combat jettison, providing the master arm switch still works. Manual release modes and selective jettison are lost, but emergency jettison remains. If just the master arm switch fails, A/G and A/A weapons cannot be released armed (but can be jettisoned safe). If both the selective jettison knob/button and the master arm switch fail, emergency jettison is all that remains.

Weapon Release Button

If one pickle button fails, try the one in the other cockpit. Jettison functions are available if both fail.

QUESTIONS

1. List three means of jettisoning A/G stores from the F-15E.

   a.

   b.

   c.

2. To jettison stores using the combat jettison mode, set up all the switches then depress and hold the _____ button.

3. If you box PYLON on the A/G selective jettison display, when jettison is accomplished _____comes off the aircraft.

   a. a single store from the selected pylon(s)
   b. the stores from a rack loaded on the selected pylon(s)
   c. the selected pylon(s)

4. The emergency jettison button is hot anytime _____ _____.

5. If the central computer fails, the A/G weapons employment and jettison capabilities still available are _____.

ANSWERS

1. a. Combat jettison
   b. A/G selective jettison
   c. Emergency jettison

2. selective jettison button on the armament control panel.

3. c

4. electrical power is on the aircraft

5. both manual release modes, A/G selective jettison, and emergency jettison

GLOSSARY

ACP Armament control panel

BIT Built-in test

BRU Bomb release unit

CFT Conformal fuel tank

OWS Overload warning system

PACS Programmable armament control system